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EDITORIAL NOTES

IMPORTED OIL SUBSTITUTION

KNOWING the facts, we sympathize fully with and endorse the recent appeal made by the Board of Trade to industrial fuel consumers to avoid conversions of plant from one fuel to another except on the advice of the Mines Department, the Petroleum Department, the Directorate of Gas Supply, or the Electricity Commission. The aim is to stop diversion of labour and materials from more vital needs and to do away with unnecessary fuel supply difficulties which can be brought about by enthusiastic, well-meaning, but not too well conceived decisions. We should like to refer at the moment to one specific aspect of this general appeal, the application of creosote-pitch mixture and of pitch. In this regard we have followed the work of the Petroleum Board closely since 1940, since when, to secure the maximum effective use of the country's production of creosote and pitch, it has been the Government's policy that consumers previously using fuel oil or creosote should, *in suitable cases*, turn over to creosote-pitch mixture. Many industrial consumers of imported fuel oil have already made or are in process of making the change; those in the latter position have been asked to complete the work at the earliest possible date. It is not that further conversions may not become desirable or even necessary. The point is, and in our view for reasons understandable enough, that from now on conversions should not be undertaken except on the advice of the Petroleum Department. Creosote is a valuable material for purposes other than its use as fuel, and supplies are not limitless. We have been privileged to discuss the problem at first hand and quite frankly with the authorities concerned. Though for obvious reasons we cannot divulge statistical information regarding it, we are aware that the Petroleum Board has effected a considerable number of substitutions, and replaced petroleum oil with a standardized grade of creosote-pitch mixture in a large number of industrial oil-burning furnace installations. The work of the Board has, we think, been very successful and very much appreciated by industrial fuel-oil users.

While we are by no means thinking in terms of saturation or shortage, as we have said, creosote is a valuable product; it has definite outlets in what may be termed relatively high grade and essential markets, and supplies are not unlimited. The technique of using pitch-creosote mixtures is established, though naturally one can expect improvements with lengthened experience. Apart from the use of such fifty-fifty mixtures, there is also the application of pitch alone as fuel, and there is available in this country a substantial supply of this material. We know that a number of consumers of pulverized hard pitch have been established, and that a large amount of work during the past eighteen months or so has been directed to the use of pitch as a liquid fuel. Of course, as with pitch-creosote mixtures, though to a greater degree, the pitch has to be heated, the circuit maintained at a state to counteract radiation losses, and care with the burner is necessary. There is also the question of transporting medium soft pitch. The advisability of examining the possibilities of liquid deliveries has been suggested, though to be dependent on liquid pitch deliveries greatly restricts storage capacity and places the consumer at the mercy of road transport. The most practical arrangement, it would appear, is to design the consuming plant so that liquid deliveries may be received, but to include melting facilities for stand-by, make-up, and similar contingencies. We look with confidence to increased development in the use of pitch alone, which has been shown to be a practical proposition and should prove a real help under the wartime conditions of to-day.

FUTURE FUEL DEMANDS

THERE is an enormous and growing demand for the two smokeless fuels gas and coke, a domestic demand which under war conditions cannot be met. A fortnight ago we suggested that the public has become more "fuel conscious." The need since the war started for economizing in fuel used for domestic purposes—a need which becomes more urgent as time passes—has brought home to the individual consumer in this country how greatly dependent he is for his well-being on modern refined sources of heat. We become increasingly impressed by the demand which exists, though it is latent for the time being, for an abundant and economic supply of gas in all areas throughout the country. Satisfaction of this demand will prove a post-war task of first magnitude. Enforced economy in fuel in wartime will, we think, meet with a reaction, to cope with which, policy should be considered and determined now. We think that expenditure on fuel will assume greater importance in the general domestic budget, that the average consumer will be prepared to spend relatively more on fuel than he or she was prepared to spend pre-war. The quantity of heat—useful heat—which will be available for a given sum of money will depend largely on how the Gas Industry sets out to satisfy the demand of which we have spoken and which will not have to be created. Post-war, people will expect a much more uniform heat service, irrespective of where they choose to live. It will cost a good deal of money to attain this uniformity, expenditure which, however, will have to be faced, and balanced by greater usage of gas and coke.

As far as we can see, there cannot, for some years at any rate, be great expansion in the use of gas without great expansion in the sale of coke in remunerative markets. For some time to come, gas and coke will be complementary fuels, and the upgrading of the coke market to our mind assumes greater importance as time passes. Coke is a cruder fuel than is gas, but a ton of coke contains a large amount of potential heat—and coke can be stored by the individual consumer. It may be said that in actual use much of this potential heat is wasted, but we confidently anticipate very marked improvements in the utilization factor. We foresee considerably higher utilization efficiencies of coke in the open fire, and we think it is true to say that under controlled conditions circulating boilers with properly insulated storage are scarcely less efficient when fired with coke than with gas. In possible district heating schemes, of which one hears a certain amount these days, we can see a limited field for coke, but no field worth mentioning for gas. We have suggested that the public, already more "fuel conscious," will demand more useful heat in their homes after the war. We must envisage this demand and seek to meet it. In most "modern" dwellings of modest size the heating arrangements are wholly inadequate. Heat comfort has been neglected. What could be more illogical than to make no provision whatever for heating the bathroom, where in cold weather one strips to shiver? Consider the ordinary arrangements for bedroom heating. In cold weather there can often be a difference of twenty or thirty degrees in the temperature of living room and bedroom. And these houses are sold as possessing every modern convenience! What is needed is greater heat input. We cannot think that after the war the average householder will be very wealthy; we do think that his fuel requirements can best be met by regarding gas and coke as complementary fuels, and on this basis seeking to reduce the cost of the *useful* heat service afforded.

On this question of future fuel demands we have been very interested in a memorandum which has just been issued by the National Smoke Abatement Society on the relation of smoke prevention to initial post-war reconstruction. This memorandum is concerned only with the prevention of smoke in the new building that will take place immediately after the end of the war, and regarding domestic premises it is suggested that the chief problem is the supply, in correlation with the volume and range of housing, of smokeless fuels suitable for open grates and "other appliances," and that this question should be examined by a Government committee representative of Government departments, fuel and appliance industries, and town planning, housing, and smoke abatement authorities. It is urged specifically that the supply of activated cokes which will burn in any types of grate should be made certain, and it is asked that an early and definite announcement in respect of the methods of heating to be used in post-war housing should be made on behalf of the Government. The knowledge that this would entail a considerable and increasing demand for solid smokeless fuel would make possible the production of suitable fuels in adequate quantity. The maximum degree of smokelessness should be adopted as a principle for all post-war housing. We are sure that the value of post-war development plans will suffer unless they include measures for materially improving the conditions of the atmosphere. The part which gas and coke could—and to our mind will—play in this needs no emphasis from us; but the Industry must be ready.

Let us turn for a moment to "commercial" premises. Here one of the proposals is that in all new premises of the type the installation of open fires should be prohibited except for special purposes and with the approval of a competent authority. The term "open fires," it should be noted, refers only to open fires burning solid fuel; it does not include gas and electric fires. It is not sufficiently realized, we think, that central heating in this country might well be considered as a "background" source of heat—supplementary or, perhaps, primary heating. Hot water radiators or other forms of central heating need not be regarded as the sole source of warmth in a room, but as providing a "background" amount of warmth that can be supplemented at will by a gas fire, or at any rate, as far as domestic premises are concerned, with an "open" fire. We feel that, had it not been for the war, "background" heating would have developed considerably.

We hope that the present memorandum of the National Smoke Abatement Society will be considered properly, and that the recommendations set out will not be lightly dismissed as were those of the Departmental Committee on Smoke and Noxious Vapours appointed by the Ministry of Health in 1920. That Committee emphasized the fact that "the present housing situation [*i.e.*, in 1920] affords a unique opportunity for constructive reform with regard to the heating, cooking, and hot water arrangements in domestic dwellings." It suggested that central heating combined with gas or electric fires was suitable for commercial buildings. It urged that the Central Housing Authority should decline to sanction any housing scheme unless specific provision was made for the adoption of smokeless methods. That was twenty years ago—the reconstruction period after the last war. Advances could be made if some of the 20-year-old proposals put forward by that Committee were put into operation at the end of the present war.

London's Coal Restrictions

The Secretary for Mines has made a direction under the Fuel and Lighting (Coal) Order, 1941, restricting the quantity of house coal which may be delivered during the next six weeks to residential premises. Deliveries will be limited to occupiers who have less than 10 cwt. in stock, and the total amount supplied to one occupier will be 6 cwt. The restriction, which is because of the drain on stocks resulting from the severe weather of the past two months, does not apply to coke. The coke position would, we suggest, have been very different, very much less satisfactory, had it not been for the stocking policy put into such good effect last year by the London and Counties Coke Association.

Personal

Mr. JAMES FLETCHER, Chief Assistant to the Wallasey Gas Department, has been appointed Works Engineer to the Preston Gas Company. Mr. A. K. COLLINGE, Works Engineer, Preston Gas Company, has been appointed Assistant Engineer to the Company.

* * *

Mr. GEORGE HELPS, Engineer, Manager, and Secretary of the Nuneaton Gas Company, intends to stand as an Independent against the Socialist candidate, Mr. Frank G. Bowles, in the Nuneaton by-election.

Obituary

Thomas Glover—Appreciations

By R. B. G.

THOMAS GLOVER, C.B.E., J.P., M.Inst.C.E., passed quietly to rest at his home, Fernhill, Norwich, in the late afternoon of Feb. 18 after an illness of some three weeks. He had, during this brief last illness, (one of the few occasions when he had had to have serious medical attention) attained the ripe age of four-score years, for on the 8th of February he very quietly celebrated his eightieth birthday with his devoted second wife and one or two very close Norwich friends.

Thomas Glover commenced his gas engineering training with his brother, the late Samuel Glover, at St. Helens, when Mr. Joseph Hall was Engineer. In 1892 he was appointed Assistant Engineer to the Carlisle Gas Undertaking under Mr. Joseph Hepworth, and in the following year he married his first wife, a lady who became well known in the Industry. In 1895 he went to the Midlands as Engineer and Manager to the West Bromwich Gas Undertaking, where he made his mark as a progressive and far-seeing young Engineer. It was during the next few years that he and his brother formed a close friendship with the late Mr. William Young, of Peebles, with whom they studied some of the developments which were then coming to the fore, the Peebles oil-gas plant, naphthalene washing, and, later, the continuous carbonization of coal.

Following this period in the Midlands, where he had formed many close friendships among his brother engineers, he was selected to follow the late Mr. John Young at Norwich in 1901, Mr. Young having been appointed to the British Gas Light Company's senior station at Hull. Mr. Glover's work during his 28 years' engineership in Norwich will be too well remembered by his older friends in the Industry to need mention here. Suffice it to say that he was President of The Institution of Gas Engineers in 1909, and that during the Great War he materially assisted the Ministry of Mines, in an advisory capacity, on the production of benzole and toluole, and, later, held an important appointment with the Coal Control Board, for which work he was made Commander of the Order of the British Empire.

In 1925, while still Engineer of the Gas Undertaking in Norwich, he was elected to the Lord Mayoralty of his adopted city. He filled this office, assisted by the late Mrs. Glover, with great distinction marked by a still further increased circle of friends in the City. Mr. Glover was a keen Rotarian, having been Founder-President of the Norwich Club. Since his retirement and until a very few months prior to his passing, he maintained a very active interest in the municipal and social affairs of the City, having been elected to the Bench in 1928 and to the Council in 1929. High appreciation of his work and friendship have been warmly expressed in communications to his widow, who has been his closest companion during the evening of his life.

T. Bernard Glover, Chief Engineer resident in Buenos Aires of the Primitiva Gas Company, is the late Mr. Glover's only surviving son. There were two other children, Lieut. S. L. Glover who was killed in France in the Great War of 1914–1918, and Christine, who died some seven years ago. In the absence of Mr. Bernard Glover I have ventured to write the above lines in affectionate memory of my Uncle.

By the Honorary Secretary of The Institution of Gas Engineers

Thomas Glover was at the time of his death at the ripe age of 80 years one of the oldest members of The Institution of Gas Engineers, being elected in 1895, and while owing to advancing years he had not for some time taken the prominent part in the business of the Institution characteristic of the more active period of his career, he will always be remembered for his kindly nature, versatility, and authoritative knowledge of carbonization.

In 1897 when he was Manager at West Bromwich he collaborated with William Young, of Peebles, in presenting a Paper on "Naphthalene in Modern Gas Manufacture and the Carburetting of Illuminating Gas."

In 1906 he contributed a Paper on "Retorting or Carbonization of Coal," in which he described a drawing incorporating the ideas of William Young, who had intimate knowledge of vertical retorts in the Scottish shale-oil industry, and of his brother Samuel Glover, of St. Helens. This arrangement, known as the Young & Glover System, assumed practical shape three years later when a setting of eight retorts 20 ft. long was erected at the St. Helens Corporation Gas-Works by West's Gas Improvement Company.

Thomas Glover was President of The Institution in 1909, and in

his Presidential Address described the chamber retorts at his works at Norwich. About this period he was a frequent speaker in the discussions at Institution meetings, and an active member of the Carbonization Committee.

During the Great War he represented the Gas Industry on the Board of the Coal Controller, acting as Assistant Controller; and for his services was awarded the C.B.E. He was a great lover of the ancient Town of Norwich and was Lord Mayor in 1925. He retired from the Norwich Station of the British Gas Light Company in 1929, after 28 years' service. J. TERRACE.

1942 "Journal" Directory

The following changes should be noted in order to keep the Directory up to date:

Page 10. BRADFORD. Prices, 11.5d.* and 11.9d. *sl.*, both plus 5% or 2-part, 5.1d.* and 5.5d. *sl.*, plus stndg. charge; single rooms 6s. 6d., houses 13s. per qr., others 3.6d.* and 4d. *sl.* plus 13s. to £12 10s. per qr. according to number of lights, all plus 10% on amt. of account. Extra outside.

" 12. BRITISH GAS LIGHT, FENNY STRATFORD. Price 13d.**; 15.48d. *sl.*

" 24. EAST SURREY. H. Long, S., retired.

" 26. FLEETWOOD. W. Oldham, E. & G.M.

" 49. MIRFIELD. Prices, 13d.; 13.3d. *sl.*; opt. 2-pt. 6.5d. plus service charge; 3.75d. *i.*

" 50. NORTH MIDDLESEX. F. Dawson, E. & G.M. *vice* J. H. Dyde, Uxbridge.

" 62. SHEFFIELD. R. Halkett, jun., S. & Asst. G.M.

" 66. STAFFORD. J. Poulson, E., M. & S.

" 82. BUCKIE. A. Mitchell (Penicuik), E. & M. *vice* H. G. Keillor deceased.

COMPANY MEETING

Tottenham and District Gas Company

The annual ordinary general meeting of the Tottenham and District Gas Company was held on Feb. 24 at Woodall House, 658, Lordship Lane, Wood Green, London, N. 22.

Mr. HENRY WOODALL, the Chairman, who presided, said : In spite of many troubles it is a pleasure to meet you and report a satisfactory year's working. The ban on public speeches still operates, and I am, therefore, only able to give you a very brief report of the Company's progress during the past year.

You will have seen from the notice sent you that a final dividend at the rate of 2½% is recommended, making 5% for the year, with which I feel the stockholders will be pleased. This is the same dividend as we paid last year, and it has been earned.

Output Well Maintained

The output of gas has been well maintained, as has also the sale of residuals. There has been a recent appeal by the Ministry of Mines for economy in the use of all fuels. Considerably more fuel is required for munition works, and it is essential that our consumers should be economical in their use of gas. The Ministry have published in the Press from time to time various ways and means of effecting economy in fuel consumption, and I hope our consumers will do their utmost to assist in this direction. My own view is that as far as possible we should try to live in one room, thereby saving fires and lights. It is essential to keep warm and uneconomic to get cold and possibly ill in consequence.

On several occasions we have had demonstrations of wartime cookery with a view to assisting the public to make the most of the fewer varieties of food that are available, and other demonstrations will be arranged in the near future.

Thanks to the Staff

Practically the whole of our employees are undertaking Home Guard, A.R.P., or fire-watching duties, and our thanks are due to them for their services. While we trust they may never be called upon to deal with a serious emergency, I feel sure that should occasion arise they will render a good account of themselves.

Many of our employees have been called to the Forces, and a considerable number are overseas. A comparatively small number have become casualties, and we would offer to the relatives of these men our most sincere sympathy.

The stockholders might be interested to know that many employees now serving with the Company contribute a small sum each week, which is augmented by the Company, to provide comforts for those serving with the Forces, and many parcels have been dispatched which, judging from letters received, have been very welcome and much appreciated.

The welfare work of the Company, an important part of our activities, has during the last year carried on as efficiently as ever. We are particularly glad this has been possible as it has never been more necessary or welcome to our employees and their families.

A licence has been received from the Board of Trade giving us power to increase the price of gas by 1d. per therm in the immediate future.

There is nothing more that I think I can tell you, but I should not like to finish my remarks without thanking everybody connected with the Company for the excellent work they have done during the year.

The report was unanimously adopted. The retiring Directors (Mr. Harold G. Palmer and Mr. Thomas Hardie) were re-elected, and the Auditor (Mr. William Cash, jun., F.C.A.) having been reappointed, the proceedings terminated with a cordial vote of thanks to the Chairman, Directors and Auditors, and also to the officers, staffs, and workmen for their services during the past year.

London Price Increases

The Gas Light and Coke Company announces an increase in the price of gas. This rise is due to increased costs of coal, oil, and wages, and after taking into account the higher prices obtained for coke and other residual products. The gas consumed after meter readings taken on and after March 2 will cost 1½d. per therm more. Since the increase of price is entirely related to the cost of manufacture it will apply to all gas consumed, whether on domestic premises or in factories.

A similar increase is announced by the South Metropolitan Gas Company, while the Directors of the Commercial Gas Company announce an increase of 1d. a therm.

A Meeting of the Central Executive Board of the National Gas Council will be held in Committee Room No. 1, Gas Industry House, 1, Grosvenor Place, S.W. 1, on Tuesday, March 10, at 1.30 p.m.

Members of The Institution of Gas Engineers are invited to attend a Joint Meeting of the Institution of Chemical Engineers and the Chemical Engineering Group of the Society of Chemical Industry, which is to be held on Tuesday, March 10, at 2.30 p.m. in the rooms of the Geological Society, Burlington House, Piccadilly, W. 1, when a Paper on "Noise and Its Suppression" will be presented by N. Fleming, M.A., of the National Physical Laboratory. An informal luncheon will be held prior to the meeting at 12.45 p.m. for 1 p.m. at Stewart's Restaurant, corner of Piccadilly and Old Bond Street. The cost, exclusive of wines, will be 3s. 6d. per head. Tickets for the meeting can be obtained from the Secretary of The Institution of Gas Engineers, 1, Grosvenor Place, London, S.W. 1.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

Manufacture of Peak Load Gas

A patent (No. 541,426; application date, June 25, 1940) has been granted to L. B. Jones, which relates to the manufacture of gas for town supply or for industrial purposes and has for its main object to afford a supply of gas under emergency or peak load conditions.

An aim of the invention is to provide a stand-by or emergency gas-making installation which is not only of simple construction and low in installation cost, but one which can be rapidly brought into service and does not involve heavy maintenance costs when not in use. It makes use of oil or other liquid hydrocarbon as the raw material, and this is converted into gas by thermal cracking in heated chambers. According to previous proposals for the manufacture of gas from oil, the oil is introduced into a chamber containing previously heated refractory brickwork and the gas produced is subsequently drawn off. The preliminary heating of the brickwork is usually effected by means of oil burners arranged at the lower end of the chamber and the oil is alterwards introduced at the upper end, the gas being drawn off in a downward direction. Such an arrangement, states the patentee, is open to the disadvantage that the oil is first brought into contact with those portions of the refractory which are at a lower temperature and this gives rise to the danger of incomplete cracking, which may eventually result in the refractory becoming clogged and the process interrupted. Obstruction may be a lengthy and difficult process. Moreover, even a partial clogging of the refractory will very greatly reduce the production of gas.

It is one of the objects of the invention to provide a plant which is not subject to these disadvantages, which is of simple and economical construction, and is capable of providing a gas similar in its main characteristics to the original supply, whether from coal gas or from coke oven plant. A further object is to provide a gas-making plant of this character which can be started up and operated at very short

(*Continued on p. 319*)

THE FUTURE OF COKE*

By J. G. BENNETT,

Director, British Coal Utilization Research Association

(*Continued from p. 289*)

These arguments apply especially to the embryo processes for making gas of high calorific value. The more general question of complete gasification by existing processes can be considered in the light of the following considerations:

(*a*) Only about one-third the total cost of gas manufacture and distribution, &c., is represented by manufacture alone—*i.e.*, say, 3d. per therm. Consequently, if the cost of manufacture could be cut by half, the average cost of gas would be reduced by, say, only 1½d. per therm, and as against this it is probable that purification and distribution costs would rise, especially if a lower calorific value gas were produced. Actually, in the normal carbonization process, the net cost of coal in many cases is not more than about 1.25d. per therm of gas, and in complete gasification (the coal being the same price) will not be lower than this. Hence, economies following the introduction of complete gasification must be found outside the retort house.

(*b*) Complete gasification can be looked on as a potential provider of a *cheaper* therm than could be provided by normal carbonization only if coke has to be sold at prices considerably lower than those ruling at present. This *cheaper* therm will, however, be more expensive than the therm produced under present relative coke and gas prices.

This leads to the third factor—namely, that of the relative market value of gas and coke. At present, gas is sold at 8d. per therm or more, while coke is sold at 2d. per therm or less. There is no doubt that it is this wide disparity which attracts attention to the possibilities of complete gasification. Since coke, for most applications, has raw coal as an immediate or a latent competitor, the price of coke cannot rise above a figure which would involve loss of existing markets. This applies particularly to water-heating systems, where the introduction of the automatic stoker has enabled graded bituminous coal to compete effectively.

There is a marked difference in the relation of price to size as between bituminous coals and the smokeless fuels. The price of large bituminous coal is anomalous, and it is probably not sufficiently appreciated by the carbonization industries that the price of domestic fuels has been to a great extent determined by the high price paid for house coal in comparison with industrial grades. This has benefited the gas and electrical industries by providing them with a cheap raw material, but it is obvious that if the indirect subsidy they receive in this way were used to cut into the very market from which it is derived —the house coal trade—the price of industrial fuels would have to rise or the standard of wages in the coal industry would have to fall. There is thus a delicate balance between all the sources of energy supplied to the domestic market which should not be disturbed without very careful enquiry. Such an enquiry falls outside the scope of the present Paper, but so far as can be seen from available data, the production and distribution of coke on an increasing scale would be the best way of combining the maximum recovery of essential materials for chemical industry with the maintenance of cheap domestic services.

The question arises whether the price of gas is affected materially by fluctuations in the market price of other sources of energy. This has not hitherto been the case. On the one hand, the price of electricity is so much higher per unit of energy that competition largely turns on convenience in use, while coal has in the past been so inconvenient that its cheapness has not saved it from loss of markets, particularly that for domestic cooking.

This raises the highly important question of the influence of research on the services which can be provided by the different forms of energy. Comparatively little research has been done on coal-burning equipment in contrast to that using gas and electricity. The coal industry has now embarked upon a scheme of comprehensive research to improve all types of appliances, and also to render more convenient the handling of coal and the disposal of waste products. It is very probable that, as a result of this research, the price of gas will, to a greater extent than in the past, be influenced by considerations of relative cost. In this connexion it is important to remember that, as Sir David Milne-Watson[71] pointed out recently, the country will be poorer after the war, and that the provision of all services will have to be made as cheap as possible.

Weighing up all these considerations, it would appear that no case has yet been made out for looking to complete gasification as the key to the future of the Gas Industry. The Industry will clearly continue its important researches into the production of gas of high calorific value by semi-synthetic processes, but there is not yet any indication that such processes can be made competitive either in respect of thermodynamic efficiency or of operating cost.

In any case, it is evident that the general adoption of complete gasification would involve the reorganization of the Gas Industry on an enormous scale. Units would have to be very large and would have to operate at a favourable load factor throughout the year. A system analogous to the base load stations of the electrical industry would have to be created, and this would involve the establishment of gas grids and new conceptions in gas distribution. None of these things is likely to happen for many years to come, and our examination of the future of coke may, therefore, fairly safely be made without reference to any immediate impact of complete gasification proposals.

5. The Markets for Coke

We have now come, as John Gilpin said, to the middle of our song. *How far can the markets for coke be developed?*

The first point I wish to make is to emphasize the insufficiently appreciated change which has occurred in our understanding of combustion. For the past 20 or 30 years it has been usual to regard the burning of solid fuels on a grate as somehow old-fashioned. The development of pulverized fuel firing was to a great extent influenced by the idea that gaseous combustion is ideal, and that the burning of a cloud of coal-dust in its apparent resemblance to that of combustion in a single phase must of necessity be an advance on the frankly two-phase system of the fuel bed. This belief is wrong in two respects: First, pulverized fuel combustion is in its essential characteristics two-phase, and is now recognized to be controlled by the conditions of interaction between the solid and gas phases. Secondly, two-phase combustion properly understood and regulated is by no means necessarily inferior to the single-phase process. There are very great possibilities in fuel beds which we are only just beginning to appreciate. As this is not a scientific Paper, I do not propose to discuss this in detail. Suffice it to say that a solid fuel which preserves its physical characteristics as it burns is capable of being used with a degree of efficiency and convenience which is fully equal—for favourable applications—to a gaseous fuel. There are three kinds of solid fuels at present available which have this property. The first is anthracite, the second coke, and the third the manufactured briquette.

I am certain that we are going to see great advances in the uses of solid fuels with controlled physical, chemical, and mechanical characteristics.

The possibilities of extending the market for coke lie both in the export trade and in inland applications. I shall not be expected to make any predictions as to the future of coke exports. It is clear that Europe will require great quantities of coke after the war and will continue to need them for many years to come. How this coke will be provided, and, more especially, how it will be paid for, are matters of Government policy which lie outside the scope of our study. It is, however, reasonable to anticipate that the pre-war coke export trade will be restored as soon as industry in Scandinavia and the Netherlands again gets going after the war.

In connexion with the inland market, I shall not attempt anything in the nature of a market analysis, principally for lack of statistical information. I shall therefore ask you to consider a number of possible lines of development, some of which are old and some essentially new, under the heads:

(*a*) Crop drying.
(*b*) Heavy duty cooking.
(*c*) Road transport—gas producer.
—steam wagon.
(*d*) Stationary gas producers.
(*e*) Special furnaces for high-temperature processes.
(*f*) Water gas production.
(*g*) The open fire.
(*h*) Other possibilities.

(a) Crop Drying

In the drying of crops the thermal efficiency is of great importance and indirect systems are generally uneconomic. This has been proved by the general failure of heat exchange dryers, even for such a valuable crop as hops. If the products of combustion are to pass through the material to be dried, it is essential that they should be free from smoke and tarry constituents. This brings coke and anthracite to the forefront as appropriate fuels, gas being generally too expensive and not available. Pioneer work of a high order has been done in this field by the London and Counties Coke Association, who have developed a coke-fired step-grate producer which has virtually solved the problem of heat supply to small-sized crop drying plant. Slade[57] estimates

* Paper presented at a Joint Meeting of the Coke Oven Managers' Association and the Institute of Fuel together with the Iron and Steel Institute and The Institution of Gas Engineers, Feb. 25.

that the full exploitation of pasture land in Great Britain with intensive fertilization would make it possible to produce up to 10 million tons of dried grass per annum and offset to this extent our dependence on imported feeding-stuffs. This application alone would require 5 million tons of coke per annum. The drying of grass can be combined with winter drying of root crops, thus improving the load on the drying plant and increasing the consumption of fuel.

The benefit of such a development to the coal industry is very considerable, as the production of the required quantity of fertilizers would itself call for a further 1½ million tons of coal, making a total of more than 6 million tons directly and indirectly consumed by more intensive cropping. If it remains the policy of the Government after the war to give the maximum encouragement to British agriculture, these developments may well come within the sphere of practical politics.

(b) Heavy Duty Cooking

Hitherto the Gas Industry has looked upon the catering trade and institutional cooking as a natural market for gas. It is not at all certain that this is economically justified. Technically, the gas cooker is so much in advance of solid fuel ranges as to compensate for the difference in cost per unit of heat. I am not here considering household cooking, where the advantages of gas lie in the high efficiency with which it can be used for light cooking and its high degree of labour-saving convenience. These two considerations do not apply with the same force to heavy-duty cooking, and the cost of fuel is a factor of great importance. The coal-fired cooking range of the past was inefficient and required constant cleaning and the handling of coals in the kitchen. Nevertheless, it is still regarded by many of the best chefs as superior to any other cooking appliance. This is due not to considerations of cost, but to the two important advantages of externally heated ovens and the delicate control of conditions on the hotplate due to the existence of graduated zones of temperature radiating from the fire. The heat-storage cooker has already proved a formidable competitor in kitchens in which most of the cooking is *table d'hôte*. It is less successful for *à la carte* cooking, owing to the relatively small hotplate area and slower ovens. It is, however, undoubtedly possible to develop coke-fired cookers with either gravity feeding or static firepots using forced draught, in which high efficiency, accurate control, and outstanding performance can be combined with cleanliness and low operating cost. Such cookers could scarcely help sweeping the heavy-duty cooking market and would create a demand for great quantities of coke.

The British Coal Utilization Research Association has developed a gravity-fed coke-fired cooker which has been successfully introduced for railway kitchen cars and for restaurant cooking. Rapid developments would probably have taken place had it not been for the war.

Coke is already the dominating fuel in the baking industry, and efforts made by the Gas Industry in some areas to displace coke by gas for baking appear to have made little headway. Generally speaking, it can be said that, by reason of the ease with which they can be fed by gravity and their controllability at moderate ratings, coke and anthracite are natural fuels for heavy-duty cooking and baking.

(c) Road Transport

I shall not discuss in detail the possibilities of the coke-fired steam wagon. Development work on this line was most unfortunately brought to a standstill some years before the war by the lack of Government encouragement. It should be started again without delay, for there are services for which the steam wagon should occupy an unchallenged position.

The war has provided a great stimulus to the development of small producers to enable motor vehicles to be operated on home-produced fuels in place of petrol. In the early stages of this development it appeared that anthracite would be the preferred fuel, but in the past year the emphasis has shifted markedly towards gas coke of special quality, treated with sodium carbonate to give high reactivity. Alkali-activated gas coke and specially prepared low-temperature cokes appear to be the best fuels for operating portable producers. I cannot here go into the details of the production of suitable cokes and their subsequent activation. A preliminary report was made to The Institution of Gas Engineers three years ago([41]). Since then very considerable progress has been made, and the technical difficulties overcome to such an extent that, if need should arise, a considerable proportion of our road transport could be transferred from petrol to producer gas. The question which concerns us here is whether producer gas could compete with petrol with the return to normal conditions of liquid fuel supply. This in turn is largely a matter of our trade balance. We must ask ourselves whether this country can afford to continue the importation of liquid fuels on the increasing scale which continued up to the outbreak of war. The following figures are highly significant: In 1913 we exported coal to the value of £50,700,000, and imported petroleum products to the value of £10,800,000. In 1938 we imported petroleum products to the value of £43,300,000 and exported coal to the value of £39,000,000. Thus a favourable trade balance in fuels of £40,000,000 has been converted into an unfavourable balance of £4,000,000. Bearing in mind that the prosperity of this country before the first world war was largely based upon our capacity to make foreign investments and purchase raw materials bought by means of our coal exports, the situation as it existed at the outbreak of the second world war must be regarded as extremely serious.

The disappearance of our foreign assets as a result of the war makes the position far worse, and we are bound, if it is technically possible, to reduce our dependence upon liquid fuel imports for many years to come.

This I regard as axiomatic, and shall therefore deal only with the question of whether the technical possibility exists, and not with the monetary and fiscal consequences of a policy of self-sufficiency in regard to road transport fuels. It is, of course, obvious that the competitive power of coke would depend upon the maintenance of a substantial import duty on petrol and diesel oil.

The present state of the gas producer vehicle is not unlike that of the petrol vehicle in the early years of the present century, and still closer to that of the high-speed diesel engine in the early nineteen-twenties. The possibilities are there, but there is great scope for technical refinements. I personally am satisfied that either under the stimulus of war, or if national policy should be so directed after the war, the producer gas vehicle can be made a sound engineering proposition which will commend itself to transport operators for quite a wide field of services. I can readily visualize one-fifth of the commercial transport of this country operated more economically on producer gas than on petrol or diesel oil so long as an import duty of £8 per ton or more is maintained on the latter fuels. This would create a market for between one and a half and two million tons of coke a year. The fuel would have to be of very high quality, but not so high as to involve any special difficulties in manufacture, or any loss of gas make which could not be more than offset by the special price which the fuel would command as compared with ordinary industrial or domestic coke.

(d) Clean Gas Producers for Stationary Use

It is very doubtful whether it would ever be practicable to manufacture and distribute gas at much below 4d. per therm. The present position is that large gas-fired furnaces, particularly open-hearth steel and glass-melting furnaces, are normally fired with hot raw producer gas costing about 1½d. per therm. It does not seem likely that the large gas machine will be displaced as a source of fuel for open hearth melting furnaces, soaking pits, and other large units of the metallurgical industries. It is rather important to consider whether smaller furnaces, essentially requiring clean gas, are rightly operated on town gas rather than producer gas from coke-fired producers. The production of clean producer gas was regarded as one of the most important developments of fuel engineering at the beginning of this century. The displacement of the gas engine by the steam turbine for large units, and by oil engines, particularly diesel, for small units simultaneously diverted interest from the gas producer.

A fresh wave of interest has been created by the war conditions which make it desirable to have an alternative supply of gas for town gas-fired furnaces. Small gas producers are being developed which give a gas of 145 to 150 B.Th.U./cu.ft. with ordinary gas coke and are cheap and easy to operate. The question we have to consider is whether this is a development which is likely to survive the war, and whether technical advances as compared with the present positions are to be anticipated. T. R. Walker([71]) has recently made a valuable survey of this development. The question is rather an important one for the Gas Industry, which has devoted a great deal of money and trouble to the encouragement of small gas-fired furnaces.

Is it going to pay industry generally to operate such furnaces on independent gas producers rather than purchase rich gas from the local gas company or a gas grid? Hitherto, small gas producers have not been so reliable and easy to operate as to be attractive to the small works without experienced fuel engineers. It seems, however, likely that the new equipment developed under the stimulus of the war will be free from many of the disadvantages of the older designs, and that clean producer gas will play a greater part in industrial heating than has been the case in the past. If so, a demand for coke will be created largely at the expense of town gas. Clearly this would be undesirable if it were to result in a shortage of coke or a difficulty in maintaining and developing gas sales. However, if the engineering industries find it cheaper to operate their furnaces on producer gas, they will do so, and the carbonization industries will have to adjust themselves to the resulting demand, possibly by raising the price of coke.

(*To be continued*)

Reduced Price at Darlington

Darlington Town Council has reduced the price of gas by 33⅓% by way of rebate. Alderman Hinks, Chairman of the Gas, Electricity, and Transport Committee, said that the reduction was being passed on to consumers in pursuance of a practice carried out by the Council for a number of years that those who made the profit should share it. At the same time he asked the public not to take it for granted that the Committee wanted them to use more gas in order to get more profit. The fact was that much more gas was being used for individual purposes, yet the Government had appealed for economy. It was of the utmost importance that the appeal should meet with response.

MIXING COKE OVEN GAS AND BLUE GAS*

By R. E. KRUGER,

Rochester Gas & Electric Corporation, N.Y.

DURING the past 15 years the gas load at Rochester has been carried by furnishing to all customers a mixture of coke oven gas and producer gas having a B.Th.U. of 538 to 540. Enough plant capacity was available so that a very large part of the entire yearly load could be taken care of in this way. In later years when the load could not be met in the above manner, we mixed in carburetted water gas of about 550 B.Th.U. to meet increased loads brought about by extremes in winter temperatures or by emergencies of one type or another. This seemed to us to be the logical way for us to carry our loads.

Our coke oven gas has an average B.Th.U. value of 636, and the producer gas mixed with it has a B.Th.U. value of 140. These were mixed in such proportion that the mixture had a B.Th.U. value of 550. After the mixture was put through the light oil scrubbers, it had a B.Th.U. of 538–540.

By so generally carrying out total sendout with this coke oven gas mixture, we, of course, made a corresponding tonnage of coke which in Rochester has always been very largely sold on the local domestic market. As all oven operators know the success of coke oven operation depends very largely upon the coke market, and those of us who operate coke ovens in the utility field fully realize the advantages of meeting the gas load in a given community with oven gas, and by so doing have the privilege of dispensing of all the resultant coke to that same community at a fair price. Such a set-up in many ways is ideal, but as might be expected we were not always able to move completely all the coke we made, and not believing there was much to be gained by large stock piles, we controlled our stocks by making less coke, which meant making less coke oven gas than was necessary to meet our gas loads so that we had to make water gas to make up the difference. This, of course, used up coke, so that we had a two-way method of controlling coke stock. Compared with straight coke oven operation, however, it was a rather expensive one chiefly because gas oil had to be used. As time went on and our gas loads became greater, particularly during the winter season, more and more water gas had to be made, entailing the purchase of greater quantities of gas oil. Strangely enough there were times when even the larger amounts of water gas made did not require enough coke to keep our coke stock as closely in hand as desired.

Along with the extra cost of water gas and the increasing amounts necessary, we began to notice an increase in complaints from our customers on our gas distribution system. These periods of increased complaints seem to coincide with the periods of fairly heavy water gas additions to our normal coke oven—producer gas mixture. A large share of the complaints came about through pilot outages, flashbacks, and noisy extinction.

There had been some indication that our service men were setting our flames too hard, so that when the water gas was added they became harder, and many of them went out or flashed back.

By studying the rates of gas input to a burner and by studying the more important phenomena of air-gas ratios in burner head (both old and newer types), we were able to instruct our service men in a way that got us away from so many service complaints. This work was very much worth while, a lot was learned, and curiously enough the service men were not the only ones who learned it. Our laboratory staff learned a lot, as did also the supervisory staff of both the gas distribution and gas manufacturing departments.

However, this did not solve our problem, for we still had to make water gas and at times of a B.Th.U. value higher than 550, so the work can only be considered to be a step in the right direction. A small amount of work seemed to indicate that a mixture of our coke oven gas and blue gas behaved just as well or better than did a mixture of coke oven gas and producer gas. If it were true that it were better to mix coke oven gas and blue gas than to mix coke oven gas and producer gas, an interesting set of possibilities appeared on the scene—for example, we could materially increase the output of 550 B.Th.U. gas from our ovens, for obviously more blue gas of 300 B.Th.U. can be added to a 636 B.Th.U. coke oven gas than can producer gas at 140 B.Th.U., and likewise less of the 550 B.Th.U. water gas need be made. Also, it would take more coke to make blue gas than to make 550 B.Th.U. water gas. This would help control our coke stock. So here was an opportunity to achieve both our objectives. From an operating point of view there was in our case nothing to worry about, for we had the water gas machine equipment already installed and all set to operate. The matter of mixing was no problem at all; we could put the blue gas into the same place we formerly put producer gas for mixing, or we could just as well introduce it into the coke oven system in other places.

From an operating point of view there was then not much to the problem. Experience over some years of operation indicates that when we operated our coke ovens at capacity, we produced 12,621,000 of 636 B.Th.U. oven gas, and when we mixed this with 140 B.Th.U. producer gas, we produced 15,480,000 of a mixture of oven gas and producer gas having a B.Th.U. of 545. In this case the oven gas represented 81.3% of the mixture and producer gas 18.7%.

Now, if we use blue gas for mixing, the same 12,621,000 of 636 B.Th.U. oven gas gives a mixture of 17,309,000 having a B.Th.U. of 545. Here the oven gas represents 72.8% of the mixture and blue gas 27.2%. It is obvious that we have increased our coke oven gas capacity from 15,480,000/day to 17,309,000/day without carbonizing additional coal. And, obviously we could meet 17,309,000 sendouts without making any carburetted water gas, whereas before we could only meet a sendout of 15,480,000 without making water gas.

It is at once obvious that in this set-up we made 45.8 tons of coke do the job formerly done by 5,670 gal. of gas oil, and since this was excess coke, we considered it good business, and whether it be good business at any time depends largely upon the price relationship between coke and gas oil or more broadly between generator fuel and enriching oil. This, of course, anyone can quickly determine in any given instance.

We were definitely sure we could make the blue gas necessary for this method of operation, and as far as the plant operations were concerned, everything pointed to blue gas addition as being more desirable and the extensive test work on appliances strongly indicated we had improvements to gain as far as utilization was concerned, so we had enough to proceed to meet directly our winter loads of 1940–41 by adding blue gas to our oven gas and making as little 540 B.Th.U. water gas as possible and consequently using as little gas oil as possible.

The following tabulation will show briefly the pertinent operating data covering gas load production for the winter season of 1939–40 as compared to that of 1940–41, the period in each case being December–April (both inclusive):

A casual observation will indicate the following:

1. Total load carried is about the same for both periods.
2. The amount of gas oil used was considerably less.
3. The amount of coke used was more by about 7,300 tons.

From an operating point of view then we accomplished all we had set out to do. From a gas distribution point of view as far as troubles on that system were concerned, including customer service complaints, it was the best the department has ever had. Actually, the service complaints were about 20% less. What portion of this decrease was due to the training given our service men in properly adjusting appliance burners and what part is due to the type of gas we distributed is, of course, rather hard to tell, perhaps impossible to tell. The net result with which this Paper is mainly concerned was gratifying. The experience was so satisfactory that we intend to do the same again this winter season.

* From a Paper to the American Gas Association.

	Total S.O.	W. gas made.	Coke used.	Oil used.	Oil/1,000 cu.ft.	Fuel/1,000 cu.ft.
1939-40	2,482,542,000	171,580,000	2,738 T	506,046 gal.	2.95 gal.	32.0 lb.
1940-41	2,478,617,000	539,241,000	10,038 T	176,895 gal.	.33 gal.	39.6 lb.

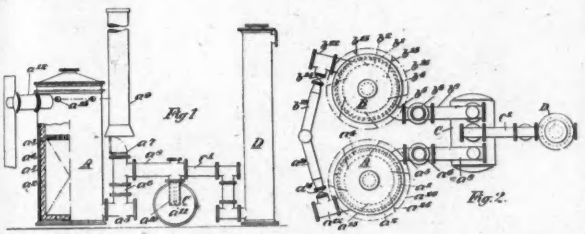
The following tabulation will show the quantities of materials used in each case when making 17,309,000 cu.ft. of sendout gas of 545 B.Th.U. :

	Oven gas.	Prod. gas.	Prod. gas fuel.	Water gas.	Water gas fuel.	Blue gas.	Blue gas fuel.	Gas oil.	Total coke.
Prod. Gas Mixing	12,621	2,859,000	20.4	1,829,000	27.5 T	—	—	5,670	47.9 T
Blue Gas Mixing	12,621	—	—	—	—	4,688,000	93.7 T	—	93.7 T
									Diff. = 45.8 T.

(*Continued from p.* 313)

notice and which requires a minimum of auxiliary apparatus. A further object is to provide a gasmaking plant for emergency gas supply in which the damage and wastage involved in heating up and cooling the apparatus is reduced to a minimum.

The accompanying diagrammatic drawings illustrate a gasmaking plant according to the invention, fig. 1 being an elevation and fig. 2 a plan. It comprises a pair of cracking chambers A and B consisting of steel shells, a^1, b^1 preferably cylindrical, lined with refractory material a^2, b^2 and filled with refractory checker brickwork, as indicated at a^3 to within a short distance from the tops of the chamber, leaving a free space. It is found desirable to provide a refractory lining which is considerably thinner than that generally employed in oil gasmaking installations of more conventional construction, and to back this lining with a relatively thick layer of heat-insulating material as indicated at a^4. In this way the first cost of the plant is kept low, with a greater conservation of heat particularly during standby periods or where full production is not required. An outlet for gas a^5 or b^5 is provided at the lower end of each chamber communicating with a vertical pipe a^6 or b^6 the upper end of each of which is closed by a valve as at a^7 and is provided with a horizontal branch a^8 or b^8 leading to a water seal or wash-box C. A stack pipe as at a^9 is disposed



vertically above each valve, or a single stack pipe common to both valves may be provided, such stack pipe having a broad taper base. These valves as at a^7 may be of the flap or clapper type and may be operated by power means such as a hydraulic cylinder if desired. The horizontal branches a^8, b^8 from the outlet pipes leading to the common wash-box C are provided with depending branches as at a^{10}, which extend below the water level in the box, the outlet of each branch being controlled by a valve, as at a^{11}. Preferably these valves as at a^{11} are of the conical type, the cone members fitting within the lower ends of the pipe branches as at a^{10} and being operable from above by suitable gear such as a hydraulic cylinder. The operating gear for the conical valves, as well as that for the flap valves, may be interlinked if desired so that one of each pair of valves is open while the other is closed. A pipe c^1 leads from the upper part of the wash-box C to a scrubbing tower D, which is common to the two gasmaking chambers A and B.

The upper part of each refractory chamber A and B, which affords a free space, is provided with means for heating the refractory lining and checker work and for introducing the oil for cracking.

The heating means are in the form of tangentially disposed blast nozzles a^{12}, b^{12} lying in a horizontal plane. The nozzles are tangential to a circle concentric with the vertical axis of the chamber such that a whirling or circular motion of the flame and products of combustion will be created within the chamber when the nozzles are in operation during heating up. The nozzles a^{12}, b^{12} are connected by pipes a^{13}, b^{13} to a common blast supply pipe, valves a^{14}, b^{14} being provided for shutting one supply when the other is in operation.

Each chamber may be provided with more than one air blast nozzle if desired.

In addition to the air blast nozzles a^{12}, b^{12} there are provided a number of oil spray nozzles a^{15}, b^{15} (shown by dot and dash lines in fig. 2) for introducing the oil for cracking purposes and also for heating purposes. These nozzles are arranged tangentially as described for the blast nozzles a^{12}, b^{12} so that a circular or whirling motion of the oil sprays will be produced. Each set of nozzles a^{15}, b^{15} is connected to a ring pipe indicated by the dot and dash circles a^{16}, b^{16} respectively which communicates with an atomizing device. The atomization is effected by means of a steam jet or jets and the mixture of steam and atomized oil is conveyed at high velocity through the pipes a^{16}, b^{16} to the nozzles a^{15}, b^{15}. It is important that this velocity should be as high as possible in order to prevent the possibility of agglomeration in the pipes. A controlling orifice is provided for each nozzle a^{15}, b^{15} so that the supply to each nozzle is properly proportioned.

As an alternative, more particularly for larger plants, the oil for heating may be supplied by separate burners or nozzles, but for smaller plants, the burners or sprays a^{15}, b^{15} may be utilized for both purposes.

It will be obvious that instead of the blast nozzles a^{12}, b^{12}, self-contained oil burners of any suitable or conventional type may be employed.

In operating the plant, the checker brickwork in one of the chambers, say A, is first brought to the required high temperature by introducing a blast of air at a^{12} and oil at one or more of the oil sprays a^{15}. For this purpose the flap valve a^7 on the outlet a^6 is opened, emitting the products of combustion by the stack which is located immediately above the valve opening. As soon as the whole of the checker brickwork has been sufficiently heated, the blast is discontinued and the burner closed down. The flap valve a^7 on the outlet is closed and the atomizer is started up to supply atomized oil or other liquid hydrocarbon to the spray nozzles a^{15}. The gas produced by the thermal cracking of the oil and steam by the heat stored in the brickwork is drawn off through the wash-box C and scrubbing tower D. During the gas production state of the chamber A the burner b^{12} of the second chamber B is started up to heat the brickwork therein. By suitably regulating the rate of heating, this may be concluded in approximately the same time as the gasmaking operation in A, so that no time is lost and at the end of the cracking stage, the chambers are changed over, the gasmaking proceeding in the second chamber B and the first being heated up again ready for the next stage. Thus a continuous or substantially continuous flow of gas may be maintained.

An emergency or standby plant according to the present invention is to be clearly distinguished from oil gas installations of the kind described in Patent Specification No. 367,812, in which the main consideration is the efficiency of the gasmaking process by the fullest possible utilization of the fuel. The present plant necessarily sacrifices operating efficiency to simplicity and low cost of the installation, which is of the utmost importance for the purpose in view—namely, for use as reserve or emergency plant which may replace the far more expensive reserve plant of more conventional type.

The material used for gasmaking according to the invention, and also for heating purposes, is oil or other liquid hydrocarbon, but other materials, such as tar and similar by-products, may be employed in addition.

Thermostatic Valve-Control Device

A thermostatic device for valve control is the subject of a patent (No. 541,957; application date, May 16, 1940) taken out by Ascot Gas Water Heaters, Ltd., and L. A. Green.

The patentees point out that with domestic water heating apparatus the thermostatic device has usually to be mounted in a position subjected to heat radiation from adjacent bodies, and in consequence undesirable variations occur in the heating up and cooling down of the thermostat and its efficient operation is thereby impaired. It is an object of the invention to provide means for overcoming these disadvantages.

Fig. 1 is a sectional elevation of a thermal device according to one embodiment of the invention. It comprises a heat-sensitive element in the form of a bi-metallic spring bow 1 having a tongue 2, the bow being arranged on a plate 3 of thermal insulating material which is secured to the gas supply pipe 4 for the burner supply pipe 5. The lower arm 6 of the spring bow is secured in grooves of the plate, the arm 6 and the plate 3 being apertured to receive a bush 7. The

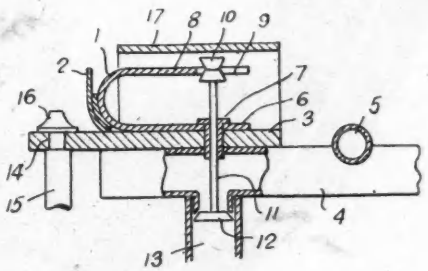


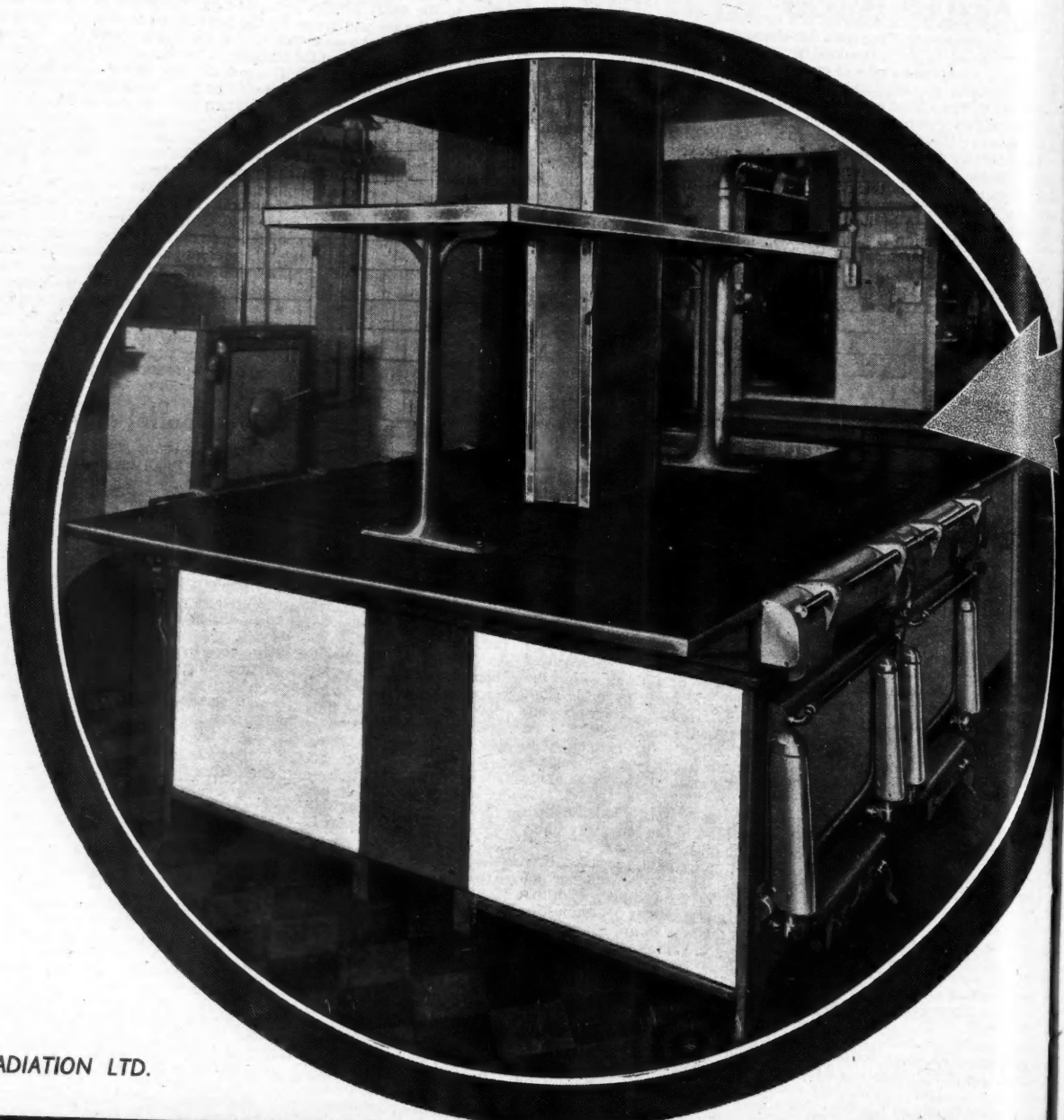
FIG. 1.

upper arm 8 of the spring bow is slotted at 9 to receive the neck of a double-coned connecting member 10, which is secured to the valve stem 11 of a safety cut-off valve 12 adapted to control the gas supply from the main gas pipe 13 to the burner supply pipe 5.

The outer end of the plate 3 is apertured to receive the threaded neck 14 of a pilot flame tube 15 which is secured to the plate by screwing the nipple 16 on to the threaded neck 14. The bow 1 is adapted to exert sufficient pressure when cold to maintain the valve 12 in closed position to cut off the supply of gas to the burner pipe 5. On the tongue being heated by the pilot flame the bow will be deformed and the upper arm 8 moved downwardly to open the valve, the valve being again closed should the pilot flame be extinguished.

The plate 3 is provided with a curved portion 17 of thermal insulating material which together with the adjacent portion of the plate forms a tubular housing which accommodates substantially the whole of the heat-sensitive element, which is thereby thermally insulated from the supporting pipe 4 and from heat radiated or transmitted from adjacent parts at the sides or from above the heat-sensitive element. In addition the housing prevents unauthorized interference with the heat-sensitive element.

The device may be accurately set for opening and closing the gas valve within predetermined intervals of time after the ignition and extinction, respectively, of the pilot flame, and irregular operation due, for example, to retarded cooling of the heat-sensitive element may thus be avoided.



RADIATION LTD.

Radiation

Gas Products Prices

The London Market Mar. 2.

There is very little movement in the prices of Coal Tar Products, as many of the usual markets are no longer available and pitch/creosote mixture as a fuel oil has taken their place.

Pitch is still a nominal market, but for such quantities as are being sold the price ranges between about 45s. and 50s. per ton. Creosote is about 5d. to 6d. per gallon. With regard to refined tar the price for next season has not yet been definitely fixed and it is expected that this will come under a Direction to be issued by the Coal Tar Controller. Pure toluole remains 2s. 5d. per gallon under the Ministry of Supply Toluene No. 2 Order. Pure benzole is about 1s. 10d., 95/160 solvent naphtha is 2s. 5d. to 2s. 9d. and 90/160 pyridine remains about 13s. 6d. per gallon. All the above prices are *ex* Makers' Works. Naphthalene prices are unchanged and are in accordance with the Control of Tar Order 1941. The Order refers to maximum prices, and the figure for refined crystal naphthalene in 2-cwt. bags and 4-ton lots is £23 per ton delivered.

The Provinces Mar. 2.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 1s. 10d. (controlled by the Control of Toluene No. 2 Order, July 5, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North, 11d. to 1s. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha, North, 1s. 9d. to 1s. 10d. Creosote, *ex* works, in bulk, North, liquid and salty, 4½d. to 4¾d.; Scotland, 4¼d. to 4¾d.; low gravity, 4¼d. to 4¾d. Fuel Grade, 4d. to 4¼d. Carbolic acid, 60's, 3s. 7½d. to 3s. 9d. Naphthalene, £15 to £20. Salts, drained, £6 to £6 10s.; whizzed 72°, £7 15s.; 78°, £9 5s. Anthracene prices fixed by Controller. Heavy oil: Unfiltered anthracene oil (min. gr. 1,080), 6d. to 6½d.; filtered heavy oil (min. gr. 1,080) 6¼d. to 7d.; heavy anthracene oil gr. less than 1,080, 5¾d. to 6d.

*In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Tar Products in Scotland

GLASGOW, Feb. 28.

Enquiries are plentiful with prices firm. Refined tar 4½d. to 5d. home and 4¼d. to 4½d. per gallon export. Creosote oil: Specification oil, 6d. to 6½d.; low gravity, 6¾d. to 7¼d.; neutral oil, 6½d. to 6¾d. per gallon; all *ex* Works in bulk. Cresylic acid: Difficult. Pale, 99/100%, 4s. 9d. to 5s. 3d.; Pale 97/99%, 4s. 3d. to 4s. 9d.; Dark 97/99%, 4s. to 4s. 3d. per gallon; all *ex* Works in buyers' packages. Crude naphtha, 6½d. to 7d. Solvent naphtha: 90/160 grade 2s. to 2s. 3d. and 90/190 Heavy Naphtha 1s. 9d. to 2s. per gallon. Pyridines: 90/160 grade 13s. and 90/140 grade 15s. per gallon.

A **Meeting** of the General Committee of the National Federation of Gas Coke Associations will be held at 11 a.m. on Tuesday, March 10, at Gas Industry House.

Messrs. Wm. Coward & Co., Ltd., have received cabled advice from their Principals, the Metropolitan Gas Company, of Melbourne, to the effect that an interim dividend of 6s. 6d. per share was paid on Feb. 14.

At the Annual Meeting of the Cambridge University and Town Gas Light Company on Feb. 27 dividends for the half-year ended Dec. 31, 1941, were declared on the Consolidated Ordinary Stock at 5%, Consolidated "B" 3½%, and Consolidated "C" 2½%, all less Income Tax, making for the year 10%, 7% and 5% respectively.

At the Invitation of the Barnet & District Gas Company and the Townswomen's Guild, a meeting was held on Feb. 20 at which Miss M. K. Gompertz, M.C.A., of R. & A. Main, Ltd., demonstrated advantageous methods of using Mor, Prem, &c., together with the recommended more plentiful vegetables. An interested audience of about 130 asked many questions. Gas undertakings who have enquiries about such dishes might like to consult Miss Gompertz by post at 48, Grosvenor Gardens, London, S.W. 1, where she would be glad to deal with them so far as possible.

Presiding at the Annual Meeting of Sunderland Gas Company Mr. T. R. Sewell said that though details could not be disclosed, shareholders could be assured that the year's results were satisfactory. A dividend was declared of 3% on the ordinary stock for the six months ended Dec. 31, making 6% for the year.

Moving the adoption of the report and accounts at the annual meeting of the Grantham Gas Company, Dr. G. A. C. Shipman, Chairman of Directors, observed that the Company had had a very good year from the balance-sheet point of view. They had, however, many difficulties to surmount. He paid tribute to the excellent work of the Managing Director, Mr. Young, and staff, which he explained was the more praiseworthy in view of the very difficult conditions with which they had had to contend. The accounts were adopted together with a dividend of 5½%, less tax, making a total dividend for the year of 8%.

At the Annual Meeting of stockholders of the Stamford and St. Martin's (Stamford Baron) Gas Light and Coke Company, Mr. Charles Dalton, Chairman of Directors, assured stockholders that in spite of many difficulties arising from the war the year's working had been satisfactory. He proposed the adoption of the accounts, the confirmation of the interim dividend of 6% less tax (paid in September, 1941), and the payment of a final dividend on the original stock of 7%. Mr. B. Clarke, Engineer and Manager, was congratulated on being made a J.P.

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GAS STOCKS AND SHARES

The volume of business in Gas Stocks and Shares last week was fairly large, though not on so heavy a scale as the previous week. There was a good demand for Imperial Continental stock. Prices were again well maintained, and it will be noticed that the only falls occurred in the stocks of those companies operating abroad.

It is satisfactory to note that, with few exceptions, dividends for 1941 were maintained at the previous year's levels. One of the exceptions is that of the Commercial Company, and the Directors have announced with regret that they are unable to recommend dividends on the ordinary or preference stocks for the past year. It will be remembered that the last payments made by the Company were an interim of 1½% for the first half of 1940 and the preference dividend for the same period.

The following quotations were changed during the week:

SUPPLEMENTARY LIST

Croydon 4 p.c. Pref. (x.d.)	68—73	Feb. 23
Hampton Court 5 p.c. Cons. (x.d.)	75—80	,,
Mid-Southern "A" (x.d.)	60—70	,,

OFFICIAL LIST

Alliance & Dublin Ord.	95—95	−2
Associated Gas & Water 4 p.c. Red. Cum. Pref.	15/—17/−	+1/−
Ditto 4 p.c. Irred. Cum. Pref.	10/—12/−	+−/6d.
Bournemouth 7 p.c. max. (x.d.)	123—128	Feb. 23
Colonial Gas Association Ord.	½−¾	−2s. 6d.
Ditto 8 p.c. Pref.	¾−1	−2s. 6d.
Croydon sliding scale (x.d.) ...	93—95	Feb. 23
Ditto max. Div. (x.d.) ...	80—85	,,
Gas Light & Coke Units ...	13/9—14/9	+−/3d.
Ditto 3½ p.c. max.	50—55	+2
Ditto 4 p.c. Pref.	68—73	+1
Ditto 3½ p.c. Red. Pref. ...	73—78	+1
Imperial Continental	53—58	−1
Mid-Southern Utility "C" (x.d.)	70—75	Feb. 23
Ditto 4 p.c. Pref. (x.d.) ...	75—80	,,
Oriental	105—110	−8
South Metropolitan Ord.	50—55	+2
South Suburban 5 p.c. Pref....	85—90	+1
Wandsworth Cons.	75—80	+3

Quotations on the London and Provincial Stock Exchanges

OFFICIAL LIST

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 26.
1,767,439	Sept. 15	7	6	Alliance & Dublin Ord. ...	90—95
374,000	Dec. 29	4	4	Do. 4 p.c. Deb.	95—100
957,608	Nov. 10	5	5	Ascd. Gas & Water U'd'ts Ord.	14/6—15/6
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	15/—17/−
535,545	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	15/—17/−
336,646	,,		4	Do. 4 p.c. Irred. Cum. Pref.	10/—12/−
561,370	Aug. 16		7	Barnet Ord. 7 p.c.	123—128
300,000	Oct. 27	1/4⅝	1/9⅜	Bombay, Ltd.	19/—21/−
690,407	Feb. 23	7	7	Bournemouth 7 p.c. max. ...	123—128*
362,025	Dec. 15	4	4	Do. 4 p.c. Deb. ...	90—95
659,955	Oct. 20	4⅜	2½	Brighton, &c., 5 p.c. Con. ...	65—70
855,000	Sept. 22	6	6	Brit. Gas Light Ord.	71—76
545,000	Dec. 15	5½	5½	Do. 5½ p.c. 'B' Cum. Pref	105—115
120,000	,,	4	4	Do. 4 p.c. Red. Deb.	75—80
10,000	Nov. 6 '33	6	4	Cape Town, Ltd., 4½ p.c. Cu. Pf.	¼−¾
626,860	Feb. 2	6	6	Cardiff Con. Ord.	95—100
24,500	Sept. 29	7	7	Colombo 7 p.c. Pref.	19/—21/−
764,169	Sept. 29	−/11.48	−/11.48	Colonial Gas Assn. Ltd. Ord. ...	¼−¾
400,000	,,	1/3.30	1/3.30	Do. 8 p.c. Pref. ...	¾−1
1,748,935	July 22 '40	2	3	Commercial Ord.	32—37
620,000	Dec. 8	3	3	Do. 3 p.c. Deb.	55—60
286,344	Feb. 16	5	5	Do. 5 p.c. Deb.	90—95
807,560	Feb. 23	6	6	Croydon sliding scale	93—98*
644,590		5	5	Do. max. div.	80—85*
620,385	Dec. 29	5	5	Do. 5 p.c. Perp. Deb. ...	99—104
179,500	Feb. 9	5	5	East Surrey 'B,' 5 p.c.	65—70
176,461	Dec. 15	5	5	Do. 5 p.c. Deb. (Irred.)...	90—95
250,000	Nov. 10	6	4	Gas Consolidation Ord. 'B' ...	13/6—14/6
250,000	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	14/6—16/6
19,122,910	July 29 '40	3⅜	4½	Gas Light & Coke Ord. ...	13/9—14/9a
2,600,000	,,	3½	3½	Do. 3½ p.c. max.	50—55
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	68—73
2,993,000	July 8 '40	3½	3½	Do. 3½ p.c. Red. Pref. ...	73—78
8,602,497	Dec. 1	3	3	Do. 3 p.c. Con. Deb. ...	77—82
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	104—108
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	102—105
700,000	Sept. 8	3½	3½	Do. 3½ Red. Deb.	84—89
5,600,000	May 13 '40	4	8	Imperial Continental Cap. ...	53—58
43,820	Jan. 26	3½	3½	Do. 3½ p.c. Red. Deb. ...	82—87
231,978	Feb. 23	5	5	M.S. Utility 'C' Cons.	70—75*
918,657	,,	4	4	4 p.c. Cons. Pref.	75—80*
675,000	Nov. 10	†4	†4	Montevideo, Ltd.	63—68
300,000	Dec. 15	7	9	Oriental, Ltd.	105—110
368,537	July 14	6½	3½	Plymouth & Stonehouse 5 p.c.	65—70
621,667	Feb. 9	7½	7½	Portsmouth & Gosport Cons.	87—92
648,999	Sept. 8	1/1	1/1½	Severn Val. Gas Cor. Ld. Ord.	16/—18/−
597,972	,, 8	−/10½	−/10½	Do. 4½ p.c. Cum. Pref. ...	16/6—18/6
2,528,714	Aug. 25	1/-	7½	South East'n Gas Cn. Ld. Ord.	13/6—15/6
1,000,000	,,	−/10½	−/10½	Do. 4½ p.c. Red. Cum. Pref.	15/6—17/6
1,068,869	,,	4	4	Do 4 p.c. Irred. Cum. Pref.	12/—14/−
4,709,895	Aug. 5 '40	4	4	South Met. Ord.	50—55
1,135,812		6	6	Do. 6 p.c. Irred. Pref. ...	75—80
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	60—65
1,895,445	Dec. 29	3	3	Do. 3 p.c. Perp. Deb. ...	72—77
1,000,000	Jan. 12	5	5	Do. 5 p.c. Red. Deb. ...	100—105
1,543,795	Feb. 9	4	4	South Suburban Ord. 5 p.c ...	70—75
512,825	,,	5	5	Do. 5 p.c. Perp. Pref. ...	85—90
500,000	,,	4	4	Do. 4 p.c. Perp. Pref. ...	68—73
250,000	,,	3½	3½	Do. 3½ p.c. Red. Pref. ...	80—85
888,587	Dec. 15	3	5	Do. 5 p.c. Perp. Deb. ...	100—105
750,541	Feb. 9	2	6	Southampton Ord.	63—68
350,000	,,	5½	5½	Swansea 5½ p.c. Red. Pref. ...	88—93
1,076,495	,,	5	5	Tottenham & District Ord. ...	80—85
338,555	,,	4	5	Do. 5 p.c. Pref.	82—87
453,380	,, 8	4	4	Do. 4 p.c. Perp. Deb. ...	82—87
1,247,505	Dec. 1	4	‡4	U. Kingdom Gas Cor. Ord. ...	14/—16/−
1,085,952	Nov. 17	4½	4½	Do. 4½ p.c. 1st Cum. Pref. ...	15/—17/−
772,709	,,	4	4	Do. 4 p.c. 1st Red. Cum.Pref.	14/6—16/6
745,263	June 16	4½	4½	Do. 4½ p.c. 2nd Non.Cum. Pf.	14/—16/−
1,200,000	Sept. 22	3½	3½	Do. 3½ p.c. Red. Deb. ...	86—91
380,606	Aug. 18	7	6⅜	Uxbridge, &c., 5 p.c.	85—90
1,371,138	Feb. 2	4	4	Wandsworth Consolidated ...	75—80
2,525,768	,,	4	4	Do. 4 p.c. Pref.	70—75
1,343,964	Dec. 15	5	5	Do. 5 p.c. Deb.	99—104
383,745		4	4	Do. 4 p.c. Deb.	82—87
588,342	Aug. 25	5	5	Watford & St. Albans Ord. ...	87—92
300,000	Dec 8	3½	3½	Do. 3½ p.c. Red. Deb. ...	84—89

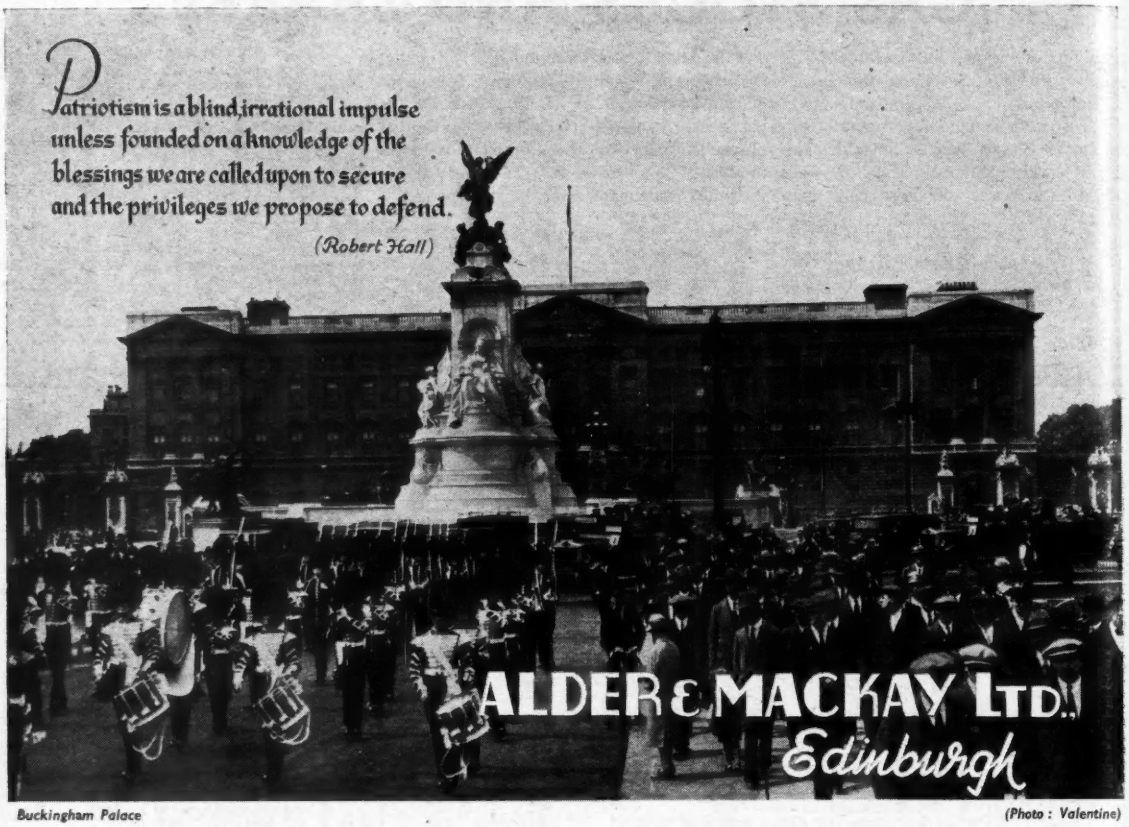
SUPPLEMENTARY LIST

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 26.
351,685	Dec. 15	5	5	Brighton, &c., 5 p.c. Perp. Deb.	93—98
28,700	,,	5½	5½	Do. 5½ p.c. Red. Deb. 1942 ...	95—100
415,250	,,	4	4	Bristol Gas Co., 4 p.c. New Deb.	95—100
140,205	Feb. 9	7	7	Cambridge, &c., 7 p.c. Cons. 'B'	105—110
295,932	Aug. 18	5	5	Cheltenham, 5 p.c. Cons. Ord....	85—90
42,500	Dec. 15	4	4	Do. 4 p.c. Perp. Deb....	75—80
150,000	Feb. 23	4	4	Croydon Gas, 4 p.c. Pref. (Irr.)	68—73*
130,000	Dec. 29	4	4	Do. 4 p.c. Deb. ...	80—85
146,700	Feb. 9	5½	5½	East Surrey, 5½ p.c. Pref. 'A' ...	85—90
53,220	,, 10	6	6	Do. 6 p.c. Cum. Pref. ...	90—100
...	Aug. 19 '40	6	4	Eastbourne, 'B' 3½ p.c....	35—40
239,135	Nov. 17	5	5	Gas Consolidation 'A' Ord. (£1)	11/6—13/6
156,600	Feb. 23	5	5	Hampton C't, 5 p.c. Cons. Ord.	75—80*
18,000	Dec. 29	3½	3½	Malta & Med'n., 7 p.c. 1st Pref.	50—60
10,845	,, 30	3½	3½	Do. 7½ p.c. 2nd Pref.	40—50
50,000	Feb. 23	£5 4 6	£5 4 6	Mid. South. Util., 'A' Cons. 5 p.c.	60—70*
65,000	Aug. 18	5	5	North Middlesex, 5 p.c. Pref. ...	75—80
70,000	Sept. 8	5	5	Plymouth & Stone., 5 p.c. Deb.	97—102
76,501	Dec. 29	4	4	Reading, 4 p.c. Perp. Deb. ...	90—95
74,777	Sept. 30	4	4	Romford, 4 p.c. Debs. (Reg.) ...	77—82
21,000	Dec. 15	5	5	Slough, 5 p.c. Perp. Deb. ...	87—92
211,740	,,	5	5	Southampton, 5 p.c. Red. Deb.	95—100
363,575	Jan. 2	5	5	Tottenham, 5 p.c. Reg. Red. Mt.	97—102
202,019	—	—	—	Tunbridge Wells, 4 p.c. Scale ...	95—100
135,257	Dec. 8	5	5	Uxbridge &c., 5 p.c. Perp. Deb.	97—102

PROVINCIAL EXCHANGES

						Quotations Feb. 27.
804,948	July 28	5	5	Bath Cons.		96—98
122,577	July 28	6	6	Blyth 5 p.c. Ord.		100—105
1,667,250	Feb. 23	5	5	Bristol, 5 p.c. max.		98—100*
120,420	Dec. 15	4	4	Do. 1st 4 p.c. Deb.		101—103
415,250	,,	4	4	Do. 2nd 4 p.c. Deb.		100—102
3,28,790	,,	5	5	Do. 5 p.c. Deb.		110—113
157,150	Feb. 2	5	6½	Chester 5 p.c. Ord.		95—98
92,500	Dec. 15	4	4	Do. 4 p.c. Pref.		77—79
36,430	,,	3½	3½	Do. 3½ p.c. Deb.		77½—82½
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...		91—95
542,270	Aug. 11	9	6	Derby Cons.		98—103
55,000	Dec. 16	4	4	Do. 4 p.c. Deb.		75—80
10,000	Aug. 11	10	10	Great Grimsby 'A' Ord. ...		155—165
6,500	,,	10	10	Do. 'B' Ord. ...		155—165
79,000	,,	10	10	Do. 'C' Ord. ...		145—155
732,000	Aug. 25	4	4	Hartlepool G. & W. Cn. & New		61—63
2,167,410	Aug 18	6	6	Liverpool 5 p.c. Ord.		101½—103½
245,500	Dec. 15	5	5	Do. 5 p.c. Red. Pref. ...		99—101
306,083	Jan. 15	4	4	Do. 4 p.c. Deb.		98—100
20,000	June 23	5	5	Long Eaton 5 p.c. Pref.		9—11
80,000	,,	5	5	Do. 5 p.c. Deb.		87—92
2,430,267	Feb. 9	5	5½	Newcastle and Gateshead Con.		18.9—19/3
682,856	,,	4	4	Do. 4 p.c. Pref.		84½—85½
776,706	June 30	3½	3½	Do. 3½ p.c. Deb.		83—84
277,285	Nov. 3	5	5	Do. 5 p.c. Deb. '43		99—101
274,000	March 17	5	5	Newport (Mon.) Ord.		86—89
13,200	Sept. 16	8½	7	Pontyp'l Gas & W. 10 p.c. 'A'		11½—12½
13,600	,,	6	5	Do. 7 p.c. 'B'		9½—10½
40,000	,,	5	6	Do. 7 p.c. 'C'		9½—10½
106,280	Feb. 9	10	10	Preston 'A' 10 p.c.		155—165
188,219	,,	7	7	Do. 'B' 7 p.c.		113—123
1,806,339	Feb. 23	6½	6½	Sheffield Cons.		123—125*
95,000	Jan. 5	4	4	Do. 4 p.c. Deb.		96—99
332,351	Feb. 16	6	6	Sunderland 6 p.c. max. ...		111—112
192,150	Feb. 9	5	5	Weston-super-Mare Cons. ...		88—92
64,338	Jan. 5	4	4	Do. 4 p.c. Deb.		85—90
33,340	,,	7½	7½	Do. 7½ p.c. Deb. ...		135—140

a—The quotation is per £1 of Stock. * Ex. d. † Paid free of income-tax. ‡ For year.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